

Table 1
Southern Seawater Desalination Plant
Contamination Assessment
Historical Aerial Photograph Interpretation



Year	Run	Photo	The Site	Surrounding Landuse
1966	3	5083	The site appears to be undeveloped and in its natural state with patchy dune vegetation over the majority of the site.	The surrounding land is predominantly in its natural state, with large areas of patchy dune vegetation covering the site. Distinct paddock boundaries can be seen but these areas contain scattered vegetation. The township of Binningup is visible to the south but it is notably smaller than it is today. A small area of cleared and possibly excavated soils occurs immediately south of Lot 8.
1977	3	5275	The site remains undeveloped although a couple of small tracks running north-south along the lot boundaries are visible. In addition, a north-south running track bisects Lot 8.	The surrounding areas have been progressively cleared for grazing/pasture land, particularly to the east. The excavation area immediately south of Lot 8 has expanded and is connected to Lot 8 by a track.
1988	3	5217	Although no significant change has occurred over the majority of the site, notable clearing of vegetation has been undertaken in the south-eastern corner of Lot 8. A portion of the cleared area appears to have been excavated. The north-south running track noted in the previous photograph is more pronounced, and another track running westward from the excavation area towards Lot 32 has been constructed. A small patch of vegetation has been cleared around the northern portion of the boundary between Lots 32 and 33.	Significant amounts of clearing have been undertaken on surrounding land mainly for pasture and grazing, particularly to the east of Lot 8. The quarrying undertaken immediately south of Lot 8 has expanded significantly. Quarrying works have also commenced on the site immediately north of Lot 8. The townsite of Binningup has grown since 1966.

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Historical Aerial Photograph Interpretation



Year	Run	Photo	The Site	Surrounding Landuse
1996	4	5180	<p>Although the majority of the site remains in its natural state, excavation works have expanded on the eastern-most portion of Lot 8, and further clearing of vegetation has occurred around the southern boundary of this lot. Two large ponds associated with the WWTP have been constructed along the boundary between Lots 32 and 33 to the north, and access tracks to the WWTP from Taranto Road, have been built.</p>	<p>A large expanse of land immediately south of Lot 8 has been cleared for grazing purposes. Quarrying works north of Lot 8 have expanded.</p>
2006	4	5078	<p>Further expansion of the quarrying works at Lot 8 to the north has occurred. Otherwise the site has remained essentially the same.</p>	<p>No significant changes - the surrounding land use is still predominantly pasture and agricultural lands, with quarrying activities to the north.</p>

Table 2
Southern Seawater Desalination Plant
Contamination Assessment
Sampling and Analysis Plan



Sample Location	Soil Sample ID	Sample Interval (m)	Date Sampled	Analytes				Site location / Area of potential environmental concern
				Metals	Nutrients	Phenols	Pathogens	
Lots 32 and 33 Taranto Road								
MW1	MW1-1	0.0-0.15	3.08.07	√				Monitoring well located on the eastern perimeter of the fenced compound.
	MW1-2	0.4-0.5						
	MW1-3	0.9-1.0						
	MW1-4	1.4-1.5						
	MW1-5	1.9-2.0						
	MW1-6	2.4-2.5						
	MW1-7	2.9-3.0						
	MW1-8	3.4-3.5						
	MW1-9	3.9-4.0						
	MW1-10	4.4-4.5						
	MW1-11	4.9-5.0						
	MW1-12	5.4-5.5						
	MW1-5x (dup)	1.9-2.0						
MW2	MW2-1	0.0-0.15	3.08.07	√				Monitoring well located on the southern perimeter of the fenced compound.
	MW2-2	0.4-0.5						
	MW2-3	0.9-1.0						
	MW2-4	1.4-1.5						
	MW2-5	1.9-2.0						
	MW2-6	2.4-2.5						
	MW2-7	2.9-3.0						
	MW2-8	3.4-3.5						
	MW2-9	3.9-4.0						
	MW2-10	4.4-4.5						
	MW2-11	4.9-5.0						
	MW2-12	5.4-5.5						
	MW2-13	5.9-6.0						
	MW2-14 (dup)	0-0.15			√			

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Sample Location	Soil Sample ID	Sample Interval (m)	Date Sampled	Analytes				Site location / Area of potential environmental concern
				Metals	Nutrients	Phenols	Pathogens	
Lots 32 and 33 Taranto Road								
MW3	MW3-1	0.0-0.15	3.08.07	√				Monitoring well located on the northern side of the fenced compound.
	MW3-2	0.4-0.5						
	MW3-3	0.9-1.0						
	MW3-4	1.4-1.5						
	MW3-5	1.9-2.0						
	MW3-6	2.4-2.5						
	MW3-7	2.9-3.0						
	MW3-8	3.4-3.5						
	MW3-9	3.9-4.0						
	MW3-10	4.4-4.5						
	MW3-11	4.9-5.0						
	MW3-12	5.4-5.5						
	MW3-13	5.9-6.0						
	MW3-3x (dup)	0.90-1.0						
MW4	MW4-1	0.0-0.15	3.08.07	√				Monitoring well located on the western perimeter of the fenced compound.
	MW4-2	0.4-0.5						
	MW4-3	0.9-1.0						
	MW4-4	1.4-1.5						
	MW4-5	1.9-2.0						
	MW4-6	2.4-2.5						
	MW4-7	2.9-3.0						
	MW4-8	3.4-3.5						
	MW4-9	3.9-4.0						
		MW4-3x (dup)		0.9-1.0				
Notes: Metals - arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury Nutrients - phosphorus, potassium, nitrogen Pathogens- e-coli, enterococci, faecal coliforms								

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Sample Location	Soil Sample ID	Sample Interval (m)	Date Sampled	Analytes				Site location / Area of potential environmental concern
				Metals	Nutrients	Phenols	Pathogens	
Lots 32 and 33 Taranto Road								
BH1	BH1-1	0.0-0.15	3.08.07	√	√	√	√	North eastern corner within fenced compound.
	BH1-2	0.4-0.5						
	BH1-3	0.9-1.0						
	BH1-4	1.4-1.5						
	BH1-5	1.9-2.0						
	BH1-6 (dup)	0.0-0.15		√	√	√	√	
BH2	BH2-1	0.0-0.15	3.08.07	√	√	√	√	South eastern corner within fenced compound.
	BH2-2	0.4-0.5						
	BH2-3	0.9-1.0						
	BH2-4	1.4-1.5						
	BH2-5	1.9-2.0						
	BH2-6 (dup)	0.0-0.15						
BH3	BH3-1	0.0-0.15	3.08.07	√	√	√	√	South western corner within fenced compound.
	BH3-2	0.4-0.5						
	BH3-3	0.9-1.0						
	BH3-4	1.4-1.5						
	BH3-5	1.9-2.0						
	BH3-6 (dup)	0.0-0.15						
BH4	BH4-1	0.0-0.15	3.08.07	√	√	√	√	North western corner within fenced compound.
	BH4-2	0.4-0.5						
	BH4-3	0.9-1.0						
	BH4-4	1.4-1.5						
	BH4-5	1.9-2.0						
	BH4-6 (dup)	0.0-0.15						
Notes:								
Metals - arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury								
Nutrients - phosphorus, potassium, nitrogen								
Pathogens- e.coli, enterococci, faecal coliforms								

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				Metals	Nutrients	Phenols	Pathogens	
Lots 32 and 33 Taranto Road								
BH5	BH5-1	0.0-0.15	3.08.07					Between the lined infiltration pond and the overflow pond
	BH5-2	0.4-0.5						
	BH5-3	0.9-1.0						
	BH5-4	1.4-1.5						
	BH5-5	1.9-2.0		√	√	√	√	
	BH5-6 (dup)	0.0-0.15						
BH6	BH6-1	0.0-0.15	3.08.07					Within the dry overflow pond
	BH6-2	0.4-0.5						
	BH6-3	0.9-1.0		√	√	√	√	
	BH6-4	1.4-1.5						
	BH6-5	1.9-2.0						
	BH6-6 (dup)	0.0-0.15						
Notes: Metals - arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury Nutrients - phosphorus, potassium, nitrogen Pathogens- e.coli, enterococci, faecal coliforms								

Table 2
Lots 8, 32 and 33 Taranto Road, Binningup
Contamination Assessment
Sampling And Analysis Plan



Sample Location	Soil Sample ID	Sample Interval (m)	Date Sampled	Analytes				Site location / Area of potential environmental concern
				Metals	TPH/BTEX	PAHs	Phenols	
Lot 8 Taranto Road								
DS1	DS1-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore and monitoring well located on the northern perimeter of the former quarry at Lot 8.
	DS1-2	0.4-0.5						
	DS1-3	0.9-1.0						
	DS1-4	1.4-1.5						
	DS1-5	1.9-2.0						
	DS1-6	2.4-2.5						
	DS1-7	2.9-3.0						
	DS1-8	0.0-0.15		√	√	√	√	
	DS1-9	0.0-0.15		√	√	√	√	
DS2	DS2-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore located in the centre of a former stockpile area at the historical quarry at Lot 8.
	DS2-2	0.4-0.5						
	DS2-3	0.9-1.0						
	DS2-4	1.4-1.5						
	DS2-5	1.9-2.0						
	DS2-6	2.4-2.5						
	DS2-7	2.9-3.0						
	DS2-8	0.0-0.15						
DS3	DS3-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore and monitoring well located on the western perimeter of the former quarry at Lot 8. Hydraulically down-gradient of quarry.
	DS3-2	0.4-0.5						
	DS3-3	0.9-1.0						
	DS3-4	1.4-1.5						
	DS3-5	1.9-2.0						
	DS3-6	2.4-2.5						
	DS3-7	2.9-3.0						
	DS3-8	0.0-0.15						
	DS3-9	0.0-0.15						
Notes:								
Metals - arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury								
TPH = Total Petroleum Hydrocarbons								
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes								
PAHs = Polycyclic Aromatic Hydrocarbons								

Table 2
Lots 8, 32 and 33 Taranto Road, Binningup
Contamination Assessment
Sampling And Analysis Plan



Sample Location	Soil Sample ID	Sample Interval (m)	Date Sampled	Analytes				Site location / Area of potential environmental concern
				Metals	TPH/BTEX	PAHs	Phenols	
Lot 8 Taranto Road								
DS4	DS4-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore and monitoring well located in the centre of the former quarry at Lot 8.
	DS4-2	0.4-0.5						
	DS4-3	0.9-1.0						
	DS4-4	1.4-1.5						
	DS4-5	1.9-2.0						
	DS4-6	2.4-2.5						
	DS4-7	2.9-3.0						
DS5	DS5-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore and monitoring well located on the eastern perimeter of the former quarry at Lot 8. Hydraulically up-gradient of site.
	DS5-2	0.4-0.5						
	DS5-3	0.9-1.0						
	DS5-4	1.4-1.5						
	DS5-5	1.9-2.0						
	DS5-6	2.4-2.5						
	DS5-7	2.9-3.0						
	DS5-8	0.0-0.15						
	DS5-9	0.0-0.15						
DS6	DS6-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore located within the bounds of the former quarrying area at Lot 8.
	DS6-2	0.4-0.5						
	DS6-3	0.9-1.0						
	DS6-4	1.4-1.5						
	DS6-5	1.9-2.0						
	DS6-6	2.4-2.5						
	DS6-7	2.9-3.0						
Notes: Metals - arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury TPH = Total Petroleum Hydrocarbons BTEX = Benzene, Toluene, Ethylbenzene, Xylenes PAHs = Polycyclic Aromatic Hydrocarbons								

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Sample Location	Soil Sample ID	Sample Interval (m)	Date Sampled	Analytes				Site location / Area of potential environmental concern
				Metals	TPH/BTEX	PAHs	Phenols	
Lot 8 Taranto Road								
DS7	DS7-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore located in within the bounds of the former quarrying area at Lot 8.
	DS7-2	0.4-0.5						
	DS7-3	0.9-1.0						
	DS7-4	1.4-1.5						
	DS7-5	1.9-2.0						
	DS7-6	2.4-2.5						
	DS7-7	2.9-3.0						
	DS7-8	0.0-0.15						
DS8	DS8-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore and monitoring well located on the southern perimeter of the former quarry at Lot 8.
	DS8-2	0.4-0.5						
	DS8-3	0.9-1.0						
	DS8-4	1.4-1.5						
	DS8-5	1.9-2.0						
	DS8-6	2.4-2.5						
	DS8-7	2.9-3.0						
	DS8-8	0.0-0.15						
DS9	DS9-1	0.0-0.15	9.11.07	√	√	√	√	Soil bore located in the centre of the footprint of the former demountable office.
Notes: Metals - arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury TPH = Total Petroleum Hydrocarbons BTEX = Benzene, Toluene, Ethylbenzene, Xylenes PAHs = Polycyclic Aromatic Hydrocarbons								

Table 2
Lots 8, 32 and 33 Taranto Road, Binningup
Contamination Assessment
Sampling And Analysis Plan



Sample Location	Groundwater Sample ID	Lot No.	Date Sampled	Analytes						Site location / Area of potential environmental concern	
				ASS Water Suite	Nutrients	Pathogens	Phenols	Additional Metals	TPH/BTEX		PAHs
MW1	MW1	32 and 33	16.08.07	√	√	√	√	√			Monitoring well located on the eastern perimeter of the fenced compound. Hydraulically up-gradient of the WWTP.
MW2	MW2			√	√	√	√	√			Monitoring well located on the southern perimeter of the fenced compound.
MW3	MW3			√	√	√	√	√			Monitoring well located on the northern side of the fenced compound.
MW4	MW4			√	√	√	√	√			Monitoring well located on the western perimeter of the fenced compound. Hydraulically down-gradient of the WWTP.
GW1/WC1	GW1/WC1			√	√	√	√	√			Water Corporation monitoring well located on the north western perimeter of the fenced compound. Hydraulically down-gradient of the WWTP.

Notes:
ASS Water Suite = Acidity as CaCO₃, Total Suspended Solids, Alkalinity as CaCO₃, Chloride, Total Sulphur, Nitrogen - Nitrate as N, Major Cations (Ca, Mg, Na, K), Dissolved Metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Mn, Al, Se, Fe), Total Metals (Al, Fe, Mn and Zn), Sulphate
Metals - arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury
Nutrients - phosphorus, nitrogen
Pathogens- e-coli, enterococci, faecal coliforms
TPH = Total Petroleum Hydrocarbons
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
PAHs = Polycyclic Aromatic Hydrocarbons
Additional Metals = Total and dissolved Aluminium and Cobalt

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Sample Location	Groundwater Sample ID	Lot No.	Date Sampled	Analytes							Site location / Area of potential environmental concern
				ASS Water Suite	Nutrients	Pathogens	Phenols	Additional Metals	TPH/BTEX	PAHs	
DS1	DS1	8	16.11.07	√			√		√	√	Monitoring well located on the northern perimeter of the former quarry at Lot 8.
DS3	DS3			√			√		√	√	Monitoring well located on the western perimeter of the former quarry at Lot 8. Hydraulically down-gradient of quarry.
DS4	DS4			√			√		√	√	Monitoring well located in the centre of the former quarry at Lot 8.
DS5	DS5			√			√		√	√	Monitoring well located on the eastern perimeter of the former quarry at Lot 8. Hydraulically up-gradient of site.
DS8	DS8			√			√		√	√	Monitoring well located on the southern perimeter of the former quarry at Lot 8.

Notes:

ASS Water Suite = Acidity as CaCO₃, Total Suspended Solids, Alkalinity as CaCO₃, Chloride, Total Sulphur, Nitrogen - Nitrate as N, Major Cations (Ca, Mg, Na, K), Dissolved Metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Mn, Al, Se, Fe), Total Metals (Al, Fe, Mn and Zn), Sulphate
 Metals - arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury
 Nutrients - phosphorus, nitrogen
 Pathogens- e-coli, enterococci, faecal coliforms
 TPH = Total Petroleum Hydrocarbons
 BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
 PAHs = Polycyclic Aromatic Hydrocarbons
 Additional Metals = Total and dissolved Aluminium and Cobalt

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Sample Location	Groundwater Sample ID	Lot No.	Date Sampled	Analytes			Site location / Area of potential environmental concern
				Pathogens	TPH	Dissolved Cadmium	
MW1	MW1	Lots 32 and 33	21.01.08	√			Monitoring well located on the eastern perimeter of the fenced compound. Hydraulically up-gradient of the WWTP.
MW2	MW2			√			Monitoring well located on the southern perimeter of the fenced compound.
MW3	MW3			√			Monitoring well located on the northern side of the fenced compound.
MW4	MW4			√			Monitoring well located on the western perimeter of the fenced compound. Hydraulically down-gradient of the WWTP.
GW1/WC1	GW1/WC1			√			Water Corporation monitoring well located on the north western perimeter of the fenced compound. Hydraulically down-gradient of the WWTP.
DS3	DS3	Lot 8	21.01.08		√		Monitoring well located on the western perimeter of the former quarry at Lot 8. Hydraulically down-gradient of quarry.
DS4	DS4					√	Monitoring well located in the centre of the former quarry at Lot 8.
DS8	DS8					√	Monitoring well located on the southern perimeter of the former quarry at Lot 8.

Notes:
Pathogens- e-coli, enterococci, faecal coliforms
IPH = Total Petroleum Hydrocarbons

Table 3
Southern Seawater Desalination Plant Binningup
Contamination Assessment
Soil Analysis Results - Metals and Phenolics



Sample Location	Soil Sample ID	Sample Interval (m)	Date	Metals (mg/kg)								Phenolic Compounds (mg/kg)
				Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	
MW1	MW1-1	0.0-0.15	3/08/2007	<5	<1	3	<5	<5	<0.1	<2	<5	NA
MW2	MW2-1	0.0-0.15	3/08/2007	<5	<1	3	<5	<5	<0.1	<2	<5	NA
MW3	MW3-1	0.0-0.15	3/08/2007	<5	<1	3	<5	<5	<0.1	<2	<5	NA
MW4	MW4-1	0.0-0.15	3/08/2007	<5	<1	3	<5	<5	<0.1	<2	<5	NA
BH1	BH1-1	0.0-0.15	3/08/2007	<5	<1	4	<5	<5	<0.1	<2	6	<LOR
BH2	BH2-1	0.0-0.15	3/08/2007	<5	<1	6	<5	<5	<0.1	<2	<5	<LOR
BH3	BH3-1	0.0-0.15	3/08/2007	<5	<1	4	<5	<5	<0.1	<2	30	<LOR
BH4	BH4-1	0.0-0.15	3/08/2007	<5	<1	4	<5	<5	<0.1	<2	<5	<LOR
BH5	BH5-5	0.0-0.15	3/08/2007	<5	<1	4	<5	<5	<0.1	<2	<5	<LOR
BH6	BH6-3	0.0-0.15	3/08/2007	<5	<1	16	<5	<5	<0.1	<2	<5	<LOR
DS1	DS1-1	0.0-0.15	9/11/2007	<5	<1	7	<5	<5	<0.1	<2	<5	<LOR
DS2	DS2-1	0.0-0.15	9/11/2007	7	<1	11	<5	<5	<0.1	<2	<5	<LOR
DS3	DS3-1	0.0-0.15	9/11/2007	<5	<1	4	<5	<5	<0.1	<2	<5	<LOR
DS4	DS4-1	0.0-0.15	9/11/2007	6	<1	6	<5	<5	<0.1	<2	<5	<LOR
DS5	DS5-1	0.0-0.15	9/11/2007	6	<1	10	<5	<5	<0.1	<2	<5	<LOR
DS6	DS6-1	0.0-0.15	9/11/2007	<5	<1	8	<5	<5	<0.1	<2	<5	<LOR
DS7	DS7-1	0.0-0.15	9/11/2007	5	<1	9	<5	<5	<0.1	<2	<5	<LOR
DS8	DS8-1	0.0-0.15	9/11/2007	<5	<1	17	6	<5	<0.1	4	9	<LOR
DS9	DS9-1	0.0-0.15	9/11/2007	5	<1	4	<5	<5	<0.1	<2	<5	<LOR
Recommended Guideline Levels												
EIL				20	3	50	60	300	1	60	200	Total Phenols: 1 mg/kg
HIL-F (Commercial/Industrial)				500	100	500	5000	1500	75	3000	35000	Phenol: 42, 500 mg/kg

Notes:

OC/OP = organochlorine / organophosphate

<LOR = Below the Laboratory Limit of Reporting



Table 4
Southern Seawater Desalination Plant Binningup
Contamination Assessment
Soil Analysis Results - Nutrients + Pathogens

Sample Location	Soil Sample ID	Sample Interval (m)	Date	Nutrients (mg/kg)					Microbials (CFU per 100 mL)			
				Nitrite + Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorus as P	Potassium	E-coli	Enterococci	Thermotolerant Coliforms	
MW1	MW1-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	
MW2	MW2-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	
MW3	MW3-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	
MW4	MW4-1	0.0-0.15	3/08/2007	na	na	na	na	na	<3	<100	<3	
BH1	BH1-1	0.0-0.15	3/08/2007	0.484	130	130	69	80	<3	<100	<3	
	BH1-6	0.0-0.15	3/08/2007	0.361	110	110	77	90	<3	<100	4	
BH2	BH2-1	0.0-0.15	3/08/2007	0.742	140	140	106	50	<3	<100	<3	
BH3	BH3-1	0.0-0.15	3/08/2007	0.563	180	180	78	70	<3	<100	<3	
BH4	BH4-1	0.0-0.15	3/08/2007	0.376	160	160	78	80	<3	<100	<3	
BH5	BH5-5	0.0-0.15	3/08/2007	0.199	20	20	30	60	<3	<100	<3	
BH6	BH6-3	0.0-0.15	3/08/2007	0.169	40	40	52	60	<3	<100	<3	
DS1	DS1-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
DS2	DS2-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
DS3	DS3-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
DS4	DS4-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
DS5	DS5-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
DS6	DS6-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
DS7	DS7-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
DS8	DS8-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
DS9	DS9-1	0.0-0.15	9/11/2007	na	na	na	na	na	na	na	na	
Recommended Guideline Levels												
EIL				NG	NG	NG	NG	NG	NG	NG	NG	NG
HIL-F (Commercial/Industrial)				NG	NG	NG	NG	NG	NG	NG	NG	NG

Notes:

CFU = Colony Forming Units

<LOR = Below the Laboratory Limit of Reporting

Table 5
Southern Seawater Desalination Plant Binningup
Contamination Assessment
Soil Analysis Results - Hydrocarbons



Sample Location	Soil Sample ID	Sample Interval (m)	Date	TPH (mg/kg)				BTEX (mg/kg)					PAHs
				C6-C9	C10-C14	C15-C28	C29-C36	Benzene	Toluene	Ethyl-benzene	meta- & para - Xylene	ortho-Xylenes	
MW1	MW1-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
MW2	MW2-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
MW3	MW3-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
MW4	MW4-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
BH1	BH1-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
BH2	BH2-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
BH3	BH3-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
BH4	BH4-1	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
BH5	BH5-5	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
BH6	BH6-3	0.0-0.15	3/08/2007	na	na	na	na	na	na	na	na	na	na
DS1	DS1-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
DS2	DS2-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
DS3	DS3-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
DS4	DS4-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
DS5	DS5-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
DS6	DS6-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
DS7	DS7-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
DS8	DS8-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
DS9	DS9-1	0.0-0.15	9/11/2007	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5	<LOR
Recommended Guideline Levels													
EIL				100	500	1000	-	1	3	5	5		Total PAHs: 20 mg/kg; Benzo(a)pyrene: 1 mg/kg;
HIL-F (Commercial/Industrial)				-	-	C16-C35 (Aromatic) 450 mg/kg; C16-C35 (Aliphatic) 28,000 mg/kg; >C35 (Aliphatic) 280,000 mg/kg.		<u>1.5</u>	<u>520</u>	<u>230</u>	<u>210</u>		Total PAHs: 100 mg/kg; Benzo(a)pyrene: 5 mg/kg;

Table 6
Southern Seawater Desalination Plant Binningup
Contamination Assessment
Groundwater - Field Parameters

Groundwater Sample Details				Analysis Results					
Sample ID	Description of monitoring location	Lot No.	Date	Appearance	Temperature (°C)	pH	Conductivity (uS/cm)	Dissolved Oxygen (DO) (mg/L)	Redox Potential (mV)
MW1	East of the Waste Treatment Plant Facility (WTPF)	32	16/08/2007	Clear and colourless, no odour	18.91	7.10	1464	7.64	165
			21/01/2008	Light grey and slightly turbid, no odour	18.94	7.08	797	8.82	105
MW2	Southern perimeter of WTPF	32	16/08/2007	Clear and colourless, no odour	18.81	7.10	1313	11.23	161
			21/01/2008	Light grey and slightly turbid, no odour	19.11	6.90	981	6.61	137
MW3	Western perimeter of WTPF	32	16/08/2007	Clear and colourless, no odour	19.23	7.47	756	9.67	155
			21/01/2008	Light grey and slightly turbid, no odour	18.29	7.05	918	5.91	123
MW4	Northern perimeter of WTPF	32	16/08/2007	Clear and colourless, no odour	18.07	7.11	994	6.67	162
			21/01/2008	Clear and colourless, no odour	19.90	6.82	828	6.65	147
GW1/WC1	North-west of WTPF	32	16/08/2007	Clear and colourless, no odour	18.13	7.44	806	9.31	160
			21/01/2008	Light grey and slightly turbid, no odour	18.61	7.20	1084	4.93	121
DS1	Northern perimeter of former quarry	8	16./11/07	Clear and colourless, no odour	18.30	7.34	890	4.25	96
DS3	Western perimeter of former quarry	8	16./11/07	Clear and colourless, no odour	18.41	7.63	590	4.09	33
			21/01/2008	Clear and colourless, no odour	22.45	7.61	985	5.91	175
DS4	Centre of former quarry	8	16./11/07	Clear and colourless, no odour	17.04	7.77	761	3.61	-1
			21/01/2008	Clear and colourless, no odour	21.31	7.35	849	5.67	160
DS5	Eastern perimeter of former quarry	8	16./11/07	Clear and colourless, no odour	18.08	7.40	1160	8.08	101
DS8	Southern perimeter of Lot 8	8	16./11/07	Clear and colourless, no odour	18.55	7.02	1620	3.37	38
			21/01/2008	Clear and colourless, no odour	22.80	7.20	917	8.55	174
Recommended Guideline Levels:									
DoE 2003 Marine Water					NG	8.0-8.4	NG	NG	NG
DoE 2003 Fresh Water					NG	6.5-8.5	NG	NG	NG
DoE 2003 Drinking Water					Aesthetic	NG	<u>6.5-8.5</u>	NG	NG
					Health	NG	NG	NG	NG

Notes:

NG = No Guideline

Italics denotes exceeds Department of Environment 2003 Marine Water Guidelines.

Underline denotes exceeds Department of Environment 2003 Drinking Water (Aesthetic) Guidelines.

Double underline indicates exceeds Department of Environment 2003 Drinking Water (Health) Guidelines.

Bold indicates exceeds Department of Environment 2003 Freshwater Guidelines.

Table 7
Southern Seawater Desalination Plant Binningup
Contamination Assessment
Groundwater - Metals



Groundwater Sample Details			Analysis Results																		
Sample ID	Description of monitoring location	Date	Dissolved Metals (µg/L)													Total Metals (µg/L)					
			Aluminium	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Zinc	Iron	Mercury	Aluminium	Cobalt	Manganese	Zinc	Iron	
LOT 32																					
MW1	East of the Waste Treatment Plant Facility (WTPF)	16/08/2007	<10	2	<0.1	<5	<1	<1	<1	<1	4	<1	<10#	<5	<50	<0.1#	<u>210</u>	<1	6	6	<u>380</u>
MW2	Southern perimeter of WTPF	16/08/2007	<10	<1	<0.1	<5	<1	<1	<1	5	<1	<10#	<5	<50	<0.1#	140	<1	8	<5	280	
MW3	Western perimeter of WTPF	16/08/2007	<10	<1	0.2	<5	<1	<1	<1	1	<1	<10#	<5	<50	<0.1#	110	<1	3	<5	70	
MW4	Northern perimeter of WTPF	16/08/2007	<10	<1	<0.1	<5	<1	<1	<1	3	<1	<10#	<5	<50	<0.1#	170	<1	6	<5	<u>380</u>	
GW1/WC1	North-west of WTPF	16/08/2007	<10	<1	<0.1	<5	<1	<1	<1	<1	<1	<10#	<5	<50	<0.1#	160	<1	8	<5	<u>340</u>	
LOT 8																					
DS1	Northern perimeter of former quarry	16/11/2007	<10	2	0.2	<1#	na	<1	<1	29	<1	<10#	<5	<50	<0.1#	<u>320</u>	na	33	12	140	
DS3	Western perimeter of former quarry	16/11/2007	<10	2	<0.1	<1#	na	<1	<1	6	<1	<10#	<5	<50	<0.1#	40	na	5	12	<50	
DS4	Centre of former quarry	16/11/2007	<10	1	0.3	<1#	na	<1	<1	18	<1	<10#	<5	<50	<0.1#	<u>280</u>	na	26	37	<u>770</u>	
		21/01/2008	NA	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
DS5	Eastern perimeter of former quarry	16/11/2007	<10	<1	0.1	1	na	<1	<1	<1	<1	<10#	<5	<50	<0.1#	<u>2000</u>	na	9	11	<u>2480</u>	
DS8	Southern perimeter of Lot 8	16/11/2007	<10	1	0.3	<5	na	<1	<1	42	<1	<10#	<5	<u>420</u>	<0.1#	<u>1130</u>	na	44	14	<u>1280</u>	
		21/01/2008	NA	NA	<0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Recommended Guideline Levels:																					
DoE 2003 Marine Water			NG	50	0.7	50	1	1.3	4.4	NG	7	70	15	NG	0.1	NG	1	NG	15	NG	
DoE 2003 Fresh Water			55	13	0.2	10	NG	1.4	3.4	1900	11	5	8	NG	0.06	55	NG	1900	8	NG	
DoE 2003 Drinking Water			Aesthetic	<u>200</u>	<u>7</u>	<u>2</u>	<u>50*</u>	NG	<u>1000</u>	<u>10</u>	<u>100</u>	<u>20</u>	<u>10</u>	<u>3000</u>	<u>300</u>	<u>1</u>	<u>200</u>	NG	<u>100</u>	<u>3000</u>	<u>300</u>
			Health	NG	<u>7</u>	<u>2</u>		NG	<u>2000</u>	<u>10</u>	<u>500</u>	<u>20</u>	<u>10</u>	NG	NG	<u>1</u>	NG	NG	<u>500</u>	NG	NG

Notes:
 NG = No Guideline
 NA = Not Analysed
Underline denotes exceeds Department of Environment 2003 Drinking Water (Aesthetic).
Double underline indicates exceeds Department of Environment 2003 Drinking Water (Health).
Bold indicates exceeds Department of Environment 2003 Freshwater Guidelines.
Italics indicates exceeds Department of Environment 2003 Marine Water Guidelines.
 # indicates Laboratory Limit of Reporting higher than the Department of Environment 2003 Drinking Water Guidelines.

Table 8
Southern Seawater Desalination Plant Binningup
Contamination Assessment
Groundwater - Nutrients



Sample ID	Description of monitoring location	Date	Potability / Nutrients (mg/L)																	
			Total Suspended Solids (TSS)	Total Alkalinity (as CaCO ₃)	Total Acidity (as CaCO ₃)	Sulphate (as SO ₄ 2-)	Sulphur (as S)	Chloride	Sulfate/Chloride Ratio	Total Alkalinity/Sulphate Ratio	Nitrite as N	Nitrate as N	Nitrate + Nitrite	Total Kjeldahl Nitrogen as N	Total Nitrogen as N	Total Phosphorus as P	Calcium	Magnesium	Sodium	Potassium
LOT 32																				
MW1	East of the Waste Treatment Plant Facility (WTPF)	16/08/2007	20	<u>450</u>	8	40	13	156	0.26	11.25	0.034	17.2	17.2	1.2	18.4	0.07	149	12	160	18
MW2	Southern perimeter of WTPF	16/08/2007	16	<u>384</u>	3	49	16	147	0.33	7.84	0.017	16.5	16.5	1.0	17.5	0.05	139	12	145	14
MW3	Western perimeter of WTPF	16/08/2007	13	<u>222</u>	2	20	7	59.6	0.34	11.10	<0.010	7.05	7.05	0.70	7.7	0.07	82	10	46	4
MW4	Northern perimeter of WTPF	16/08/2007	18	<u>383</u>	6	41	14	141	0.29	9.34	0.055	17.8	17.9	1.2	19.0	0.06	133	13	138	13
GW1/WC1	North-west of WTPF	16/08/2007	5	<u>245</u>	<1	17	6	96.1	0.18	14.41	<0.010	3.59	3.59	0.60	4.2	0.04	101	11	52	2
LOT 8																				
DS1	Northern perimeter of former quarry	16/11/2007	20	<u>248</u>	16	70	23	77.4	0.90	<i>3.54</i>	0.023	8.55	8.58	na	na	na	102	17	50	8
DS3	Western perimeter of former quarry	16/11/2007	14	<u>152</u>	21	81	27	52.4	1.55	<i>1.88</i>	<0.010	0.019	0.019	na	na	na	72	13	38	2
DS4	Centre of former quarry	16/11/2007	105	<u>200</u>	11	57	19	91.0	0.63	<i>3.51</i>	0.034	0.822	0.856	na	na	na	55	14	72	8
DS5	Eastern perimeter of former quarry	16/11/2007	97	<u>223</u>	15	150	50	113	1.33	<i>1.49</i>	0.027	15.3	15.4	na	na	na	101	16	110	17
DS8	Southern perimeter of Lot 8	16/11/2007	49	<u>303</u>	27	177	59	203	0.87	<i>1.71</i>	0.342	8.50	8.84	na	na	na	164	29	138	21
Recommended Guideline Levels:																				
Mulvey 1993			NG	NG	NG	NG	NG	NG	0.5	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
Swedish EPA 2002			NG	NG	NG	NG	NG	NG	NG	<i>5</i>	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
DoE 2003 Marine Water			NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
DoE 2003 Fresh Water			NG	NG	NG	NG	NG	NG	NG	NG	NG	3.1	NG	NG	NG	NG	NG	NG	NG	NG
DoE 2003 Drinking Water	Aesthetics	NG	<u>200</u>	NG	NG	NG	NG	<u>250</u>	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
	Health	NG	NG	NG	NG	NG	NG	<u>500</u>	NG	NG	<u>3</u>	NG	NG	NG	NG	NG	NG	NG	NG	NG

Notes:
 NG = No Guideline
Underline denotes exceeds Department of Environment 2003 Drinking Water (Aesthetic).
Double underline indicates exceeds Department of Environment 2003 Drinking Water (Health).
Bold indicates exceeds Department of Environment 2003 Freshwater Guidelines.
Italics indicates exceeds Department of Environment 2003 Marine Water Guidelines.
Hatched indicates exceeds Mulvey 1993 guideline level.
Striped indicates exceeds Swedish EPA 2002 guideline level.

Table 9
Southern Seawater Desalination Plant Binningup
Contamination Assessment
Groundwater - Hydrocarbons and Phenols

Sample Location	Soil Sample ID	Sample Interval (m)	TPH					BTEX					Phenols	PAHs	
			C6-C9	C10-C14	C15-C28	C29-C36	Total C5-C36	Benzene	Toluene	Ethyl-benzene	meta- & para - Xylene	ortho-Xylenes			
LOT 32															
MW1	East of the Waste Treatment Plant Facility (WTPF)	16/08/2007	na	na	na	na	na	na	na	na	na	na	na	<LOR	na
MW2	Southern perimeter of WTPF	16/08/2007	na	na	na	na	na	na	na	na	na	na	na	<LOR	na
MW3	Western perimeter of WTPF	16/08/2007	na	na	na	na	na	na	na	na	na	na	na	<LOR	na
MW4	Northern perimeter of WTPF	16/08/2007	na	na	na	na	na	na	na	na	na	na	na	<LOR	na
GW1/WC1	North-west of WTPF	16/08/2007	na	na	na	na	na	na	na	na	na	na	na	<LOR	na
LOT 8															
DS1	Northern perimeter of former quarry	16/11/2007	<20	<50	<100	<50	<220	<1	<2	<2	<2	<2	<2	<LOR	<LOR
DS3	Western perimeter of former quarry	16/11/2007	<20	<50	100	<50	<220	<1	<2	<2	<2	<2	<2	<LOR	<LOR
		21/01/2008	<20	<50	100	<50	<220	NA	NA	NA	NA	NA	NA	NA	NA
DS4	Centre of former quarry	16/11/2007	<20	<50	<100	<50	<220	<1	<2	<2	<2	<2	<2	<LOR	<LOR
DS5	Eastern perimeter of former quarry	16/11/2007	<20	<50	<100	<50	<220	<1	<2	<2	<2	<2	<2	<LOR	<LOR
DS8	Southern perimeter of Lot 8	16/11/2007	<20	<50	<100	<50	<220	<1	<2	<2	<2	<2	<2	<LOR	<LOR
Recommended Guideline Levels															
DoE 2003 Marine Water			NG	NG	NG	NG	NG	500	NG	NG	NG	NG	Naphthalene 50 ug/L; Total PAHs 3.0 ug/L.	Phenol 400 ug/L	
DoE 2003 Fresh Water			NG	NG	NG	NG	NG	950	300	NG	200 as p-xylenes only	350	Naphthalene 16 ug/L; Total PAHs 3.0 ug/L.	320 ug/L	
DoE 2003 Drinking Water		Aesthetic	NG	NG	NG	NG	NG	<u>1</u>	<u>25</u>	<u>3</u>	<u>20</u>		Benzo(a)pyrene 0.01 ug/L	NG	
		Health	NG	NG	NG	NG	NG		<u>800</u>	<u>300</u>	<u>600</u>			NG	
ANZECC/ARMCANZ 2000 Low Reliability			NG	NG	NG	NG	7	NG	NG	NG	NG	NG	NG	NG	
Tsvetnenko (1998)			NG	NG	NG	NG	300 to 4500	NG	NG	NG	NG	NG	NG	NG	

Notes:

NG = No Guideline

NA = Not Analysed

Underline denotes exceeds Department of Environment 2003 Drinking Water (Aesthetic) Guidelines.

Double underline indicates exceeds Department of Environment 2003 Drinking Water (Health) Guidelines.

Bold indicates exceeds Department of Environment 2003 Freshwater Guidelines

Italics indicates exceeds Department of Environment 2003 Marine Water Guidelines

Hatching indicates exceeds the ANZECC/ARMCANZ 2000 Low Reliability Guidelines

Stripes indicates exceeds Tsvetnenko 1998

indicates Laboratory Limit of Reporting higher than the Department of Environment 2003 Drinking Water guidelines.

* Default to DoE 2003 Drinking Water guideline for Cr(VI).

Table 10
Southern Seawater Desalination Plant
Contamination Assessment
Groundwater Analysis Results - Pathogens



Sample ID	Description of monitoring location	Date	Microbials (CFU/100 mL)		
			<i>E. coli</i>	<i>Enterococci</i>	Thermotolerant Coliforms
MW1	East of the Waste Treatment Plant Facility (WTPF)	16/08/2007	<1	<1	<1
		21/01/2008	<10	70*	<10
MW2	Southern perimeter of WTPF	16/08/2007	<1	<1	<1
		21/01/2008	<10	<10	<10
MW3	Western perimeter of WTPF	16/08/2007	<1	<1	<1
		21/01/2008	<10	<10	<10
MW4	Northern perimeter of WTPF	16/08/2007	<1	7*	<1
		21/01/2008	<10	<10	<10
GW1/WC1	North-west of WTPF	16/08/2007	<1	<1	<1
		21/01/2008	<10	<10	<10
DS1	Northern perimeter of former quarry	16/11/2007	na	na	na
DS3	Western perimeter of former quarry	16/11/2007	na	na	na
DS4	Centre of former quarry	16/11/2007	na	na	na
DS5	Eastern perimeter of former quarry	16/11/2007	na	na	na
DS8	Southern perimeter of Lot 8	16/11/2007	na	na	na
Recommended Guideline Levels:					
NHMRC 2006 Recreational Water Use			NG	40	150
DoE 2003 Marine Water			NG	NG	NG
DoE 2003 Fresh Water			NG	NG	NG
DoE 2003 Drinking Water		Aesthetics	NG	NG	NG
		Health	NG	NG	NG

Notes:

NG = No Guideline

Bold indicates exceeds NHMRC2005 Guidelines for the Management of Risks in Recreational Waters

<LOR indicates less than Laboratory Limit of Reporting

CFU = Colony Forming Units

* An approximate count only.

33 CFU/100 mL is median for more than one sample. 60 - 100 CFU/mL is for an individual sample.